SDR Forum Meeting Report

Tokyo Institute of Technology

May 15, 2001

Edgar Carlos

carlos@mobile.ss.titech.ac.jp

What is the SDR Forum?

It is a non-profit organization
comprised of 100 corporations
from around the globe.

What is its purpose?

It is dedicated to promoting the
the development and use of
Software defined radio (SDR)
technologies for wireless systems.

Who are the members?

Customers	Suppliers/ Manufactures	Standards & Regulatory Organizations	Academia & Industry Associations
-End Users	-Systems	-Liaison Partners	-Major
-Carriers	-Subsystems	(3GPP, MeXe,	Universities
-Service	-Components	OMG)	-Cooperative
Providers	-Software	-Major Standard	Research
-Government	Developers	Bodies	Partners
-Civil Service	-System	-Country Specific	
Agencies	Integrators	Regulators	
-Military	-Tool Developers		

SDR Forum Meeting @Tokyo (www.sdrforum.org)

April 24-25

Keynote Speakers:

Dr. R. Kohno - Status on Studies in the IEICE Software Radio Study Group

Hiroshi Asami -SDR and its Implications for Spectrum Management.

Highlights of the Technical Committee Session:

BS Download

Handset Download

Dr. Kohno from Yokohama University: "Status on Studies in the IEICE Software Radio Technical Group"

http://www.ieice.or.jp/cs/jpn/sr/

- **Society: IEICE Communication Society**
- **Established: December, 1998**
- **Purpose:**
1) **Promote research and development in the field of Software Defined/ Reconfigurable Radio**
2) **Allow protocol, SW, and HW to be easily integrated with future digital radio systems**
3) **Foster cross-organization and collaboration among academia, industry and government**
4) **Organize national and international symposia and workshops on Software Defined Radio**

Mr. Hiroshi Asami (Director of the Radio Department of Telecommunications Bureau) from the Ministry of Public Management, Home Affairs, Posts and Telecommunications, Japan: "SDR and its Implications for Spectrum Management"

In Japan there is a rapid increase in the number of mobile phone users (60 Million) as well as Internet subscribers.

PDC @800 MHz: NTT Docomo, AU

PDC @1500 MHz: J-phone, AU, NTT Docomo

CDMA @800 MHz: AU

PHS @1900 MHz: DDI pocket, NTT Docomo, ASTEL

**These trends require new technologies to cope with the service demand
(IMT 2000):**

- **High speed transmission around the tens of Mbps**
- **Multimedia capabilities**
- **transparency to the Internet Protocol**
- **SDR which can change the air interfaces or frequency using SW**

Efficient use of Radio Spectrum

Regulatory Change
Creation of Frequency Allocation Plan to meet the long range demand

Migration of allotment and assignment
Facilitate frequency reallocation in order to meet the technical development and demand increase international harmonization, allocation for newly developed mobile communication systems, and the migration of fix microwave links.

Development of Frequency resource
Use of less used frequency
R&D of new systems

Merits of Software Defined Radio

Operators: the operator can redefine Subscribers systems.

Manufactures: mass production is easy for common HW platforms.

Users: global circulation using a single handset.

Researchers: creation of new R&D areas.

Government Initiatives for SDR

- **Spectrum Allocation**
    Efficient use of the frequency resource
    Facilitate frequency migration
    Dynamical allocation of spectrum to meet commercial demands

- **Study for SDR conformity assessment method (since 2000)**
- **Radio Monitoring**
    Study group (circa 1997)
    Development of prototype receiver (since 2000)

Andrew Jennings, Advance Communication Technologies:
"Base Station Software Download and Management"

Why standardize software download to base stations?

- **It can create a competitive market for supply of network infrastructure.**

- **It can serve to improve the rate of development of technology.**

What needs to be standardized?

It is not possible to define a generic channel or physical interface for download. Only a **generic protocol for download** can be specified.
Protocol Standardization:

Base station aspects:
- Download procedures for mobile
- Download procedure for the base station

Capability determination:
- Mobile with fixed capabilities
- Base station clarifies its capabilities

Download Process

1) Network controller request capability check to the base station
2) Base station returns status
3) Network controller sets configuration on the base station
4) Base station returns status
5) Network controller starts the download
6) Base station returns status
7) Network controller completes the download to base station
8) Base station returns status

Audit Framework for Air Interface Configuration

This is a management reporting process that gives auditable record of configuration.

Network Advisories

Messaging that advises the network about a pending change (element creation, element removed, etc)

Future Path

Creation of a SDR Virtual Machine to allow unregulated software changes.

Andre Krützfeldt, Sun Microsystems, Inc.:
"J2ME Platform and the SDR Forum"

J2ME is a version of the Java technology, which covers the range of extremely tiny commodities such as cellular phones, smart cards, etc. The main feature of J2ME is the Kahlai Virtual Machine (KVM) which is a footprint of the original Java Virtual Machine, but design for resource constraint devices.

Connected Limited Device Configuration (CLDC) runs on top of KVM. CLDC is the base technology that defines the core virtual machine features and the libraries that all small, Java-powered devices will share.

CLDC Goals

- Define a standardized, minimum footprint Java technology platform for a broad variety of connected, resource constrained devices.
- Enable dynamic, secure delivery of interactive Java technology based applications and content to small devices.
- Enable 3rd party applications development for these devices.

Why is it important?

- Downloadable software to wireless devices is popular.
- Will allow access to customized and personalized services from anywhere, and from a variety of devices.
- Need a real programming language and standardized APIs to realize the full potential of the wireless revolution.

KVM Technical Facts:

- Implemented in C (core of VM about 24 000 lines)
- Static size of VM executable:

   40-80 KB depending on platform and compilation options.

   On palm or Win32 about 60 KB

Java Application Manager

- KVM/CLDC includes an optional component known as the Java Application Manager JAM:

   1) Helps integrating KVM with a microbrowser.

   2) Allows downloading of Java technology-based applications from the Internet via HTTP.

3) Allows management (installing, launching, and deleting) of applications on devices without a file system.
4) Intended to facilitate porting efforts.

Ken Riordan, Motorola Inc.: "Motorola Viewpoint: an SDR-enabled Commercial Wireless World"

Main discussion: Terminal Management

What is terminal management?

- **One application of SDR technology**
- **Terminal Management: collection of client/server applications and functions that allow operators/service providers the ability to remotely manage terminals in their networks.**
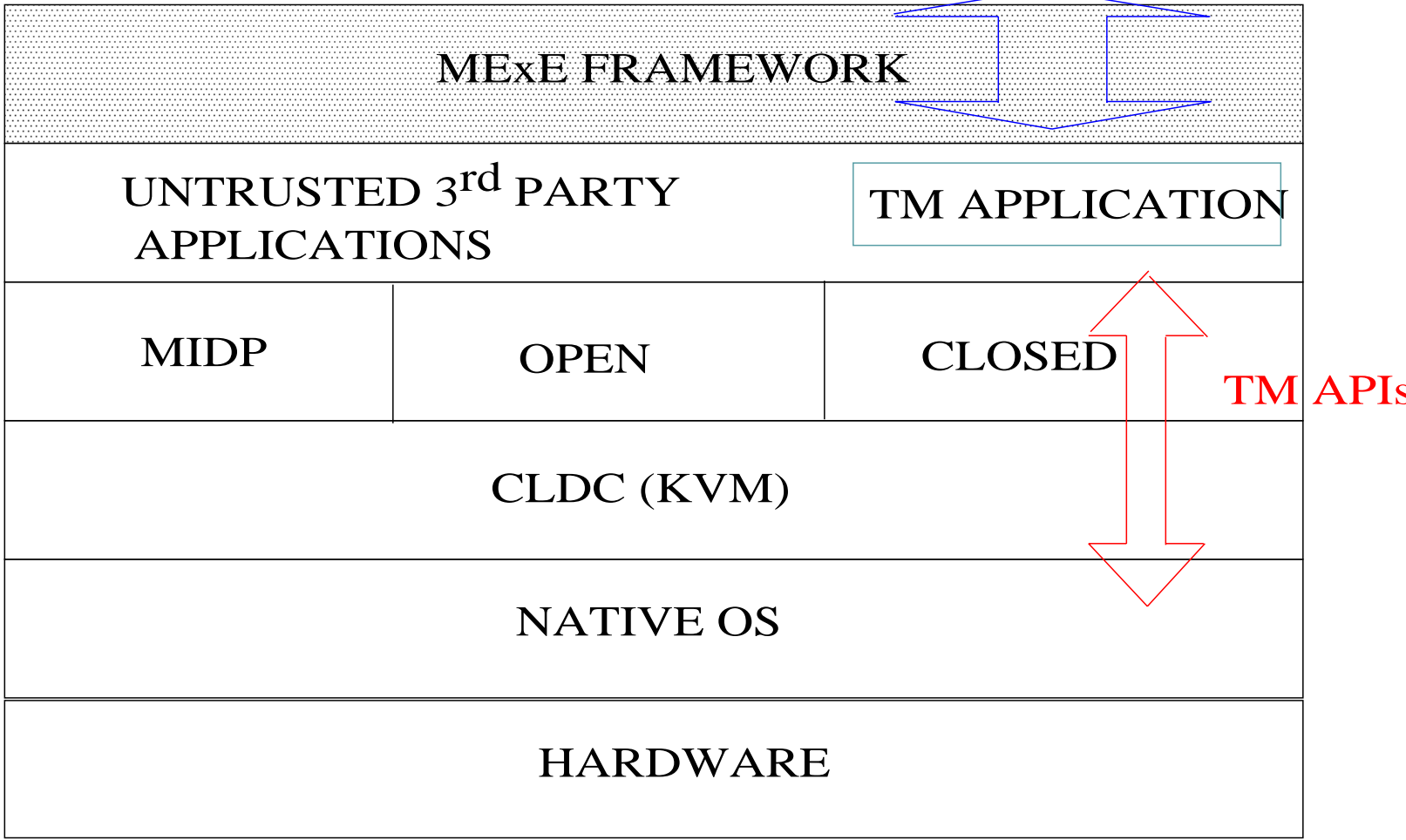
Suggested technology: MExE

What is MExE?

Mobile Station Application Execution Environment (MExE) is a wireless protocol that is designed to be incorporated into smart mobile phones.

MEXE's aim is to provide a comprehensive and standardized environment on mobile phones for executing operator or service provider specific applications. MExE is designed as a full application execution environment ON THE MOBILE terminal. It builds a Java Virtual Machine into the client mobile phone. Java is the "write once, run anywhere" programming language.

TERMINAL MANAGEMENT IN MExE

Terminal Management
Data Download/Upload

MExE FRAMEWORK

UNTRUSTED 3rd PARTY APPLICATIONS	TM APPLICATION

MIDP	OPEN	CLOSED

TM APIs

CLDC (KVM)

NATIVE OS

HARDWARE

OTHER PRESENTATIONS

Calinel Pasteanu, Siemens: "SDR- The Siemens Handheld View"
Another view of handheld SDR download using Java and Midleware.

Thomas Yang, NTT Docomo, USA Labs.: " I-mode and KVM"
Discusses the use of Java applications in I-mode.

Y. Chika, KDDI: "PHS BS Software Download"
Discusses the advantages of reconfigurable base stations from the perspective of an operator.

In Conclusion:

- BS download standardization was discussed.

- The introduction of Java technology into SDR.

- The use of MExE in handheld terminal management.

- The initiatives and activities of the government concerning SDR.

- The description of the activities concerning the IEICE SDR Study Group.

Resources:

SDR FORUM: http://www.sdrforum.org
MExE FORUM: http//www.mexeforum.org
3GPP : http//www.3gpp.org
OMG: http//www.omg.org